

INTRODUCTION TO GROUNDWATER INVESTIGATIONS (165.7)

3 DAYS

This introductory course is designed to provide participants with information concerning hydrogeological processes and the necessary elements of a sound groundwater site investigation. It is intended for personnel who are involved in groundwater contamination investigations but have **little prior hydrogeological experience**. This course is **not** designed for geologists or hydrogeologists.

Topics that are discussed include hydrogeological definitions and concepts; rock cycle; soil formation; depositional environments; geochemistry; geophysics; drilling, construction, and placement of monitoring wells; groundwater sampling considerations; and groundwater modeling.

Instructional methods include lectures, group discussions, case studies, and class problem-solving exercises.

After completing the course, participants will be able to:

- Identify the components of a groundwater system.
- List the primary hydrogeological parameters to be considered in a site investigation.
- Construct a groundwater-flow net and calculate hydraulic gradient at a site.
- Discuss common geophysical survey methods.
- Identify geochemical profiles in contaminated groundwater.
- Identify common aquifer stress tests and the information obtained from each.
- Describe monitoring well drilling and construction techniques.

Note: Scientific calculators are required.

Continuing Education Units: 1.9

Course Dates and Locations

1999

October 13–15	Region 5	December 7–9	Region 2
---------------	----------	--------------	----------

2000

January 19–21	Edison, New Jersey	May 9–11	Region 8
February 1–3	Region 3	June 20–22	Region 7
February 15–17	Cincinnati, Ohio	July 11–13	Region 9
February 29 – March 2	Region 4	August 8–10	Region 10
March 21–23	Region 1	September 19–21	Region 6

Agenda

INTRODUCTION TO GROUNDWATER INVESTIGATIONS (165.7)

City, State

Month, Date, Year

COURSE DIRECTOR: , Tetra Tech NUS, Inc.
INSTRUCTORS: , Tetra Tech NUS, Inc.
 , Tetra Tech NUS, Inc.

<i>DAY and TIME</i>	<i>SUBJECT</i>	<i>SPEAKER</i>
Tuesday, Date		
8:00 – 8:50 a.m.	Introduction (Section 1)	
9:00 – 9:55 a.m.	Rock Cycle (Section 2)	
10:05 –11:00 a.m.	Depositional Environments (Section 3)	
11:10 –12:00 p.m.	Soils (Section 4)	
12:00 – 1:00 p.m.	LUNCH	
1:00 – 2:00 p.m.	Drilling Methods (Section 5; Heath, pp. 52-63)	
2:10 – 5:00 p.m.	Cross-Section Exercise (Section 12, Problem 1)	
Wednesday, Date		
8:00 – 9:30 a.m.	Hydrogeology (Section 6; Heath, pp. 1–33)	
9:40 –11:30 a.m.	Well Installation (Section 7; Section 12, Problem 1; Heath, pp. 52–63 and 78–79)	
11:30 –12:30 p.m.	LUNCH	
12:30 – 3:00 p.m.	Hydrogeological Exercises: Burettes, 3-Point Problem, Flow Net Problem (Section 12, Problem 4)	
3:10 – 5:00 p.m.	Aquifer Stress Tests (Section 12, Problem 5)	

<i>DAY and TIME</i>	<i>SUBJECT</i>	<i>SPEAKER</i>
Thursday, Date		
8:00 – 8:50 a.m.	Vadose Zone (Section 8; Heath, p. 18)	
9:00 – 9:50 a.m.	Geophysical Methods (Section 9)	
10:00 –11:00 a.m.	Geochemical Methods (Section 10; Heath, pp. 64–71 and 78 –79)	
11:10 –12:00 p.m.	Groundwater Models (Section 11; Heath, pp. 16–19 and 24–33)	
12:00 – 1:00 p.m.	LUNCH	
1:00 – 5:00 p.m.	Groundwater Investigation (Section 12, Problem 6)	

REQUIREMENTS

INTRODUCTION TO GROUNDWATER INVESTIGATIONS (IGWI) (165.7)

FACILITY REQUIREMENTS

1. Classroom Space

One classroom at least 60×40 feet is needed to present this course. Adequate space is required to present modules, set up and conduct numerous exercises, display exhibits and maps, and store equipment during the course. If one room with these dimensions is not available, two rooms will be needed: one to perform modules and exercises and another to set up additional exercises and store equipment. The classroom should contain enough tables and chairs to comfortably seat 35 students. Tables should be 3 feet deep and each student should be allotted approximately 3 linear feet of table space. Two extra tables for instructor use are also needed. The classroom should have adjustable lighting and adequate ventilation and electrical outlets. The classroom should be on ground floor level if possible. See **Figure 1**, Ideal Classroom Layout for IGWI, to help in the selection of an appropriate room.

2. Facility Access

ERTP staff will require 24-hour exclusive access to and use of the classrooms from course setup through closure. The course director will arrange the initial setup time and discuss exclusive use requirements with the facility contact.

3. Visual Equipment

The classroom should contain the following materials:

- Chalkboard, chalk, and erasers or white board, markers, and erasers.

These materials will be needed each day. If they are not available at the facility, please notify the course director so alternate arrangements can be made to ship them to the facility.

4. Refreshments and Meals

Coffee and soft drinks that students can purchase should be available near the classroom. A list of nearby, quick-service restaurants and maps to these restaurants should be provided to Environmental Response Training Program (ERTP) Training Registration 8 weeks prior to the course.

5. Telephones

The facility should have telephones available for outgoing telephone calls. The facility contact should provide the course director with a telephone number that can be used for incoming emergency calls and messages.

6. Maps and Area Information

A legible map (not hand drawn) indicating the locations of the facility and area hotels should be sent to ERTP Training Registration 8 weeks prior to the course. Hotel names, addresses, telephone numbers, and regular

government rates should be included. Directions to and from the airport should also be provided, either on the facility and hotel map(s) or on a separate map. In addition, please include the telephone number of the local chamber of commerce.

PARTICIPANT INFORMATION

This course is designed for personnel who are involved in groundwater investigations but have **little or no hydrogeological experience**.

No more than 35 participants may be enrolled in each IGWI course. Any deviations in class size must be approved in advance by the course director. E RTP Training Registration and the local contact must coordinate participant registration. Any questions the participants have about enrollment in E RTP courses should be directed to E RTP Training Registration (participants in EPA Regions 1, 6, and 8 should direct questions to their regional training contact).

The local contact should inform participants of the following course-related information:

- No special clothing is required; casual dress is encouraged.
- Scientific calculators are required.
- The course lasts 3 full days.
- Classes begin at 8 a.m.; the course ends at approximately 5 p.m. on Thursday.
- To receive an EPA course certificate, 100-percent attendance is mandatory.

SHIPPING REQUIREMENTS

1. Facility Contact

The name and telephone number of the facility contact should be provided to E RTP Training Registration. The facility contact will be responsible for receiving a Federal Express shipment of approximately 35–40 boxes and large shipping cases. The boxes and large shipping cases must be stored in a secured area for 4–7 days. Course instructors will require access to these materials at the time of course setup on Monday.

2. Equipment Delivery

All course materials are shipped via Federal Express and delivered to the facility's assigned Federal Express drop off/pickup location. The physical address (if different from the mailing address), telephone number, and hours of operation for the facility must be provided to E RTP Training Registration so shipping arrangements can be made. Federal Express will not deliver to a post office box or leave materials after hours. If the drop off/pickup location is not the classroom, the facility personnel will be required to move the equipment to the classroom.

Equipment is usually delivered by 4:30 p.m. on the Friday before the course. The course director will verify whether the shipment has been received at the facility. E RTP staff will call Federal Express to trace the shipment, if necessary.

3. Shipping Equipment

Normal Federal Express pickup for materials being shipped back to the E RTP Training Center in Cincinnati, Ohio, is on Thursday after 5:00 p.m. or on Friday.